

Members of the national, provincial and overseas Press visited the UK Atomic Energy Authority's Dounreay Experimental Reactor Establishment on Wednesday, October 17, 1962. The visit was arranged primarily to show the work on the Fast Reactor Experiment.

This is the text of an introductory talk by Dr Robert Hurst, G.M., Director, Dounreay Experimental Reactor Establishment, as it was published in the ATOM magazine in December 1962.

It is a great pleasure to me personally, and also to all my colleagues, to be able to welcome such a large and distinguished gathering of the press to Dounreay. It is now nearly five-and-a-half years since the last Press visit, and any of you who were here then will have some difficulty in recognising the site.

During the interval we have of course not been entirely neglected by the Press, as can be seen by this book of press cuttings, covering our recent activities, large and small. But I am sure you will agree that from time to time it is well worth while to actually come and see for yourselves, particularly when so many varied activities are involved, and when such rapid progress is being made.

Why fast reactors?

The first topic I would like to cover concerns the obvious question "Why build fast reactors at all?" The U.K.A.E.A. programme has since the very earliest days included fast reactors in its development since it has always been clear to us that fast reactors promised to provide the best possible means of using the plutonium formed in our first phase civil thermal reactors. The programme therefore started in the early 1950s with the exploration of the physics of fast reactors at Harwell in the zero energy reactors ZEPHYR (plutonium fuelled) and ZEUS (uranium-235 fuelled). Work on sodium handling, heat transfer, etc., was started at Harwell and at the Windscale and Capenhurst R. & D. laboratories. Work on fuel alloys and refractory canning materials was started at Culcheth and Springfields. Out of this

the development of the design office at Risley was able to evolve the design of the Dounreay Fast Reactor as the first large scale power producing fast reactor. This was at a time of one of the boldest and most imaginative projects in the whole nuclear energy business, anywhere in the world. Despite all the setbacks and the difficulties, surely not unexpected in such a novel and pioneering venture, it is still our judgement that this reactor is already well on the way to fulfilling the purpose for which it was built and that it will go on producing vital information for many years to come.

Now that the first civil reactors at Bradwell and Berkeley are getting into their stride, generating electricity and at the same time making about half a gram of plutonium for every megawatt-day, it is even more clear than it was perhaps in 1955 at the start of this project, how vital the fast reactor is to our British programme, and how well it will in turn complement the thermal reactors going into the Generating Board's system and use up the tons of plutonium available in the 1970s. So that my answer to the question is "No nuclear system is complete without fast reactors".

Activities

The second point to which I wish to draw your attention concerns the full range of activities carried out at Dounreay. The site is almost unique in the world, as it was planned and has been built up to be a fully integrated site, with all the fuel manufacturing and processing plants needed to keep its reactors going, all the fuel development and examination laboratories needed to make advances into the future, and all the scientific devices and all the scientific disciplines needed to give a thorough understanding of the processes we are controlling – be they in the reactors or in the chemical or metallurgical plants. This integrated site, almost entirely given over to one single objective – fast reactor development – employs 2,500 souls, including 400 professional scientists and engineers, and is therefore a most powerful tool for development, and if I may say so a great national asset. The work we are doing here now may well have a large influence on the future

prosperity of the country in the late 1970s and 1980s. Thus because of its objective, and because of all the staff and facilities, Dounreay plays an absolutely essential part in this country's future nuclear development programme and is likely to remain a household word for the technical press for the next decade or so.

Difficulties

The third point I would like to make concerns the difficulties we have met in pioneering so many new technologies. We have never sought to hide the fact that we have run into difficulties and it would indeed have been surprising if we had not. Perhaps we could have done with fewer all at once; and sometimes we could have wished that the modifications which were found to be necessary as a result of our work had not taken quite so long to carry out, giving the impression to the outside world that nothing much was happening. But we ourselves have never doubted our ability to overcome our troubles and our morale has never been seriously affected by these technical difficulties. However, sometimes we have taken rather a blow from uninformed comments from a distance, and we would always welcome on-the-spot discussion, both of our successes and our failures. What I would like to emphasise is that the main hold-ups have been in the area of mechanical and electrical devices, that is on the conventional side, and in the lack of complete understanding of the chemical properties of sodium and its alloys. Nothing mysterious or difficult has been found on the nuclear side. The work we have already done has I think gone a long way to rectify this situation and we are in fact now in a very good position to decide the main technical features of a much better and bigger fast reactor. Design studies already underway are now looking very promising and we have asked some colleagues from the Risley Design offices to come up and display some of the features of their latest work to show how both the failures and successful remedial work have all been taken into good account in deciding the next stage

of development. We should be ready with detailed proposals within the next year for a Prototype Fast Reactor.

Development work

You will see not only the major plant, but also some of our development laboratories, especially those dealing with the fabrication and examination of new types of plutonium bearing fuel. As I mentioned at the beginning the fast reactor is considered to be the best means of exploiting plutonium, and in the opposite sense it is also true that plutonium is the best nuclear material to use in fast reactors. All our development facilities are therefore designed to handle plutonium, which as you will know, is highly alpha active and toxic, and requires very specialised and expensive containment arrangements. We also have to cope with very high beta-gamma radiation levels in examining and processing fuel taken out of the reactors, and we have evolved at Dounreay many novel and interesting pieces of equipment to work in this field, and which we are pleased to be able to show you today.

Life in the far north

I would like to digress from the technical for a moment to mention our life up here in the far north. We have a magnificent working situation, between the hills and the sea, a most healthy and invigorating atmosphere, and a nice comfortable and friendly town to live in, with many varied leisure pursuits available in town and country. Half our number have always had their homes here and welcome the new opportunities our industry has brought them, and our relations with the Caithness people have always been easy and happy. The incoming "Atomics" as they are locally called, have generally found that, far from being uncivilized, many of the older graces and virtues still flourish here. The majority I am quite sure would, if pressed, admit that the far north suits them, and that life is freer here,

that work is more singleminded and without the distractions of city life, and that they would not now want to return to a metropolitan jungle.

As Sir William has said, this reactor has supplied not only new information but the electricity over your heads which is lighting this room. You are probably aware that we raised the power to 30MW in August. We did a run then until it was time to take out some fuel for examination and make some minor modifications. We raised the power again a few weeks ago and two weeks ago had sufficient steam for us to start setting up the turbine. A week ago we were able to couple the generator and last Sunday we synchronized with the grid and now we are connected with the North of Scotland Hydro Electric Board's system. We in fact at the moment are limiting our generation to 3 megawatts, which is about the dayload for the site but at night time we are in fact exporting to Thurso, as the load drops, a little over half of a megawatt.

I must emphasise once again that the whole site including the reactor is experimental, looking forward to the future. I consider that we have now in our reactors, our plants and laboratories, our staff and our work people, one of the finest integrated instruments for nuclear development that has yet been set up, and I am very proud to be able to show it to you today.

Now, ladies and gentlemen, you may often have heard phrases used about Dounreay such as stumbling from crisis to crisis. I suppose "crisis to crisis" is a very apt description to a layman of any worthwhile scientific programme which is passing from one new matter to another new matter. But it is my belief that at Dounreay we do not stumble but are marching steadily forward and if today we set our colours flying and give a few beats on the drum I hope you will excuse us.